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## Guest Editorial—Lots of information collected about marine living resources, but where is it? And can it be trusted?

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“Out of sight—out of mind”, is an excuse that has often been used to explain why so little is known about biodiversity in the sea. With the exception of what washes up on the beach and what can be seen in the fish market, marine biodiversity remains largely hidden from human eyes. This means we have to remind ourselves—or be reminded—that marine biodiversity needs our attention, care and protection, just like that of forests, mountains and wetlands.

Cambodia has one of the world’s largest inland fisheries and naturally the focus of international organizations, as well as the national government, has been largely on the conservation and sustainable use of freshwater fisheries resources. The unique hydrological features associated with the seasonal reversal of flow to and from the Tonle Sap Lake have intrigued scientists from all over the world, and there is great concern about the potential damage caused by constructing hydro-electric power plants across the Lower Mekong water course (see e.g. Hogan *et al.*, 2004; Campbell *et al.*, 2006; Baran & Myschowoda, 2009).

Much less attention has been given to the marine biodiversity of Cambodia. Marine capture fisheries, though increasing, remain less than 20% the size of the inland fisheries, and hence fewer resources have been allocated to this field. Over the years, numerous international projects have operated in the Cambodian coastal zone, and much information has been gathered about vulnerable ecosystems, the socio-economics of coastal residents, and the impacts of legislation relating to environmental degradation and use of fisheries resources.

One of the largest projects, usually called the UNEP South China Sea Project for short, involved

seven countries surrounding the South China Sea, over 16 million dollars in direct funding, and about the same amount in local “in-kind” contributions, and lasted from 2002 through 2008 (Vo & Pernetta, 2010). The results from this project have entered the international scientific literature (e.g. Vo *et al.*, 2013), and provided government agencies with national reports, trained staff members, established demonstration sites for the general public (e.g. UNEP, 2007) and published posters and booklets on various ecosystems (e.g. UNEP, 2004).

For Cambodia, this project funded assessments of coral reef, seagrass and mangrove habitats. We now have a fair knowledge of the size of these vulnerable ecosystems and, equally importantly, where they are located. This information constituted the baseline information for developing a *National Action Plan for Coral Reef and Seagrass Management in Cambodia 2006–2015* (FiA, 2006). The project also funded the publication of a bilingual field guide to the marine living resources in Cambodia, which unfortunately was printed in far too few copies (Ing *et al.*, 2006).

Smaller projects have taken over and carry out Reef Check and Seagrass Watch procedures to monitor the state of selected reefs and seagrass beds. Some of these projects are carried out by local Cambodian government employees, but most use foreign volunteers, often marine biology students. Few Cambodians have diving skills or can afford the equipment and other associated costs. However, dive shops exist for tourists, and the staff and boats from these shops have been involved in several projects.

Every NGO has its own “mission and vision”, but this may seem like semantics when applying for foreign grants: you put your pen where the money

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is. If the donor wants you to include gender issues, you include them in your application; if they focus on sustainability, you make this a priority goal; and so on. One project may be specifically dedicated to seahorses—small threatened fish used in traditional medicine. Another project may focus on the economic costs and benefits of tourism in coral reef areas. Other projects may focus on socioeconomics and the development of small-scale fisheries. In spite of this diversity in aims and goals, there is a lot of overlap in the reports that result from these projects. Many socioeconomic questionnaires containing basically the same questions are presented to basically the same people by different projects. Similarly, the same coral reef may be surveyed by transects, manta-tows and random quadrat photography. Unfortunately there are sometimes conflicting results among reports.

The information gathered from this multitude of projects is valuable and useful, but often difficult to locate. In many cases, project teams write status reports for their funding bodies only. Most finish their projects with impressive reports on glossy paper, but rarely with an ISBN identification number, and rarely have these reports been subject to peer-review. Some information is available in Environmental Impact Assessment reports in connection with major development projects, usually in the private sector, but EIA reports are often inaccessible to the public, including scientists, because they are considered the private property of the company. Other information is available only in Khmer-language internal government reports, such as most fisheries statistics. There is a great need for a comprehensive review of the available data, and to improve the quality and reliability of the data from different studies.

The staff of government agencies, both national and local, try their best to keep up with all the findings from the various projects, but it often looks as if legislation is drafted, implemented and enforced at the same time as the field data are collected. One could say that Cambodia implements the holistic, integrated approach from need rather than choice, and “citizen science” was in use here years before it became fashionable in western countries (after the economic crisis drastically cut funding for science).

Government staff depend on scientific information to draft meaningful and effective regulations. Cambodian fisheries officers, however, usually have to collect field data at the same time they draft management measures, such as the *National Plan of Action for Sharks* (Ing *et al.*, 2004). Fortunately international organizations provide guidelines, but data still have

to be collected. Although an increasing number of Cambodian ministerial officers have received upper level academic degrees (MSc and PhD), they rarely get the opportunity to be involved in basic research or participate in research publications. There is a need for collaboration between universities and government agencies that goes beyond supervising graduate thesis projects.

Cambodia is a signatory party to several international conventions related to marine biodiversity (Nao *et al.*, 2013). This means that Cambodia is expected to participate in meetings, submit national reports, and most importantly, comply with international regulations. This has occasionally led to awkward situations. At one time, Cambodia was urged to take measures against illegal fishing vessels, which were fishing tuna in the Atlantic Ocean. Obviously no Cambodian fishermen own vessels capable of fishing tuna in the Atlantic, but somehow these vessels had been registered in Cambodia and were flying the flag of Cambodia, but without a Cambodian license to fish. Recently, the European Union imposed an embargo on fisheries goods from Cambodia because “despite several warnings” the country had not taken sufficient measures to prevent illegal, unreported and unregulated (IUU) fishing. Cambodia is working on a National Action Plan to prevent, deter and eliminate illegal, unreported and unregulated fishing (NPOA-IUU fishing), but this takes time and requires funding.

Cambodia has four nationally protected areas in the coastal zone: Three National Parks (Bokor, Kep and Ream), and one Wildlife Sanctuary (Peam Krasop, part of which—Koh Kapik—is also a Ramsar Wetland of International Importance). These are all land-based but have a marine component. In addition, the UNEP South China Sea Project introduced a new concept for conserving critical habitats of certain species—Fisheries Refugia—and the South-East Asian Fisheries Development Center (SEAFDEC) assisted Cambodia to implement marine refugia (Ing *et al.*, 2010). A real Marine Protected Area, however, has yet to be formally established in Cambodia. The underwater area surrounding the islands of the Koh Rong Archipelago has been mentioned several times, and many reef areas have been surveyed again and again. In spite of all the information available, however, conflicting interests have so far stalled the formal establishment of a Marine Fisheries Management Area.

One of the latest government targets of the *Strategic Planning Framework for Fisheries 2010–2019*, is to increase aquaculture production by 15% annually. One can only guess at the impacts to vulnerable

coastal environments of such an immense enterprise. Once again, it appears that research and policy development are carried out simultaneously with cutting mangroves and digging ponds. Moreover, this is happening at a time when most western countries are trying to ban imports of cultured fish and shrimps from countries that use wild-caught trash-fish for feed.

In Cambodia, conservation issues, which are often supported by small NGOs, have to compete with development projects, which are often supported by wealthy private companies. Unfortunately, the economy usually wins over ecology. The coastal marine waters of Cambodia house a diverse and possibly unique marine life, and it is important that this resource be protected for future generations (as well as to attract tourists). Having multiple NGO-supported projects without much coordination of their efforts has created a lot of information, but has had little or no lasting effect on the conservation or management of marine resources. The action plans remain plans without action.

It is time for someone in Cambodia to review the existing information and extract data from available reports that might be used for knowledge-based selection of sites to be protected. Also, NGO and international projects should be required to make their final results publicly available at a common website repository in Cambodia. The existing websites that contain some of this information should be urged to collaborate. The conservation of Cambodia's marine biodiversity is too important to end up as a pile of glossy paper reports on bookshelves in government offices.

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